Supporting Information (SI):

Highly-efficient Ru/Al-SBA-15 Catalysts with Strong Lewis Acid Sites for the Water-assisted Hydrogenation of *p*-Phthalic Acid

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Table S1. *Structural parameters of supports (SBA-15, AS-x).*

Entry	Supports	S_{BET} (m^2/g)	D_p (nm)	V (cm^3/g)
1	SBA-15	640	6.6	1.03
2	AS-50	827	6.5	0.89
3	AS-10	744	6.6	0.89
4	AS-3	611	6.5	0.85
5	AS-1	499	6.5	0.76
6	AS-0.5	365	6.5	0.55

Table S2. *The amounts of acid sites determined by pyridine-FTIR.*

Catalyst	The amounts of acid sites (umol/g)					
	150 ℃			400 ℃		
	B	L	Total	B	L	Total
Ru/SBA-15	2.8	35.8	38.6	0.9	2.6	3.5
Ru/AS-50	4.0	61.4	65.4	1.3	27.9	29.2
Ru/AS-10	4.1	83.4	87.5	1.4	49.4	50.8
Ru/AS-3	3.5	160.1	163.6	1.5	81.1	82.6
Ru/AS-1	2.7	92.7	95.4	1.7	33.7	35.4
Ru/AS-0.5	1.7	86.5	88.2	1.0	26.4	27.4

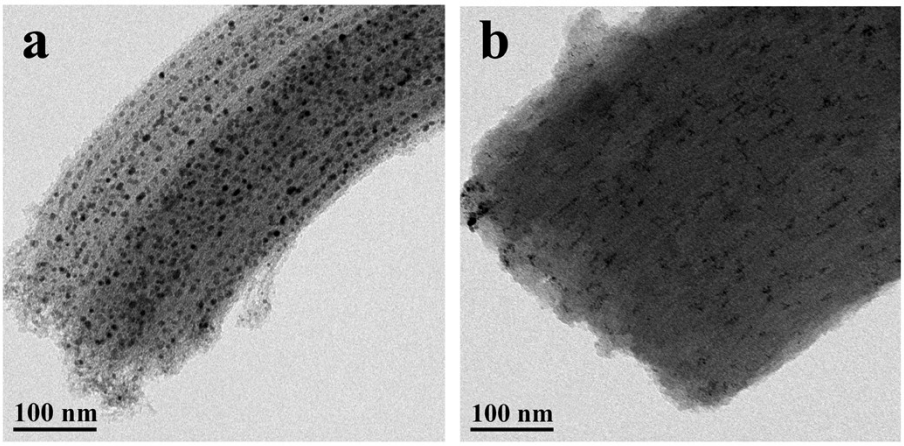

Fig. S1. TEM images of (a) Ru/AS-3 and (b) Ru/AS-3-U (U refers to used catalyst for fourteen times).

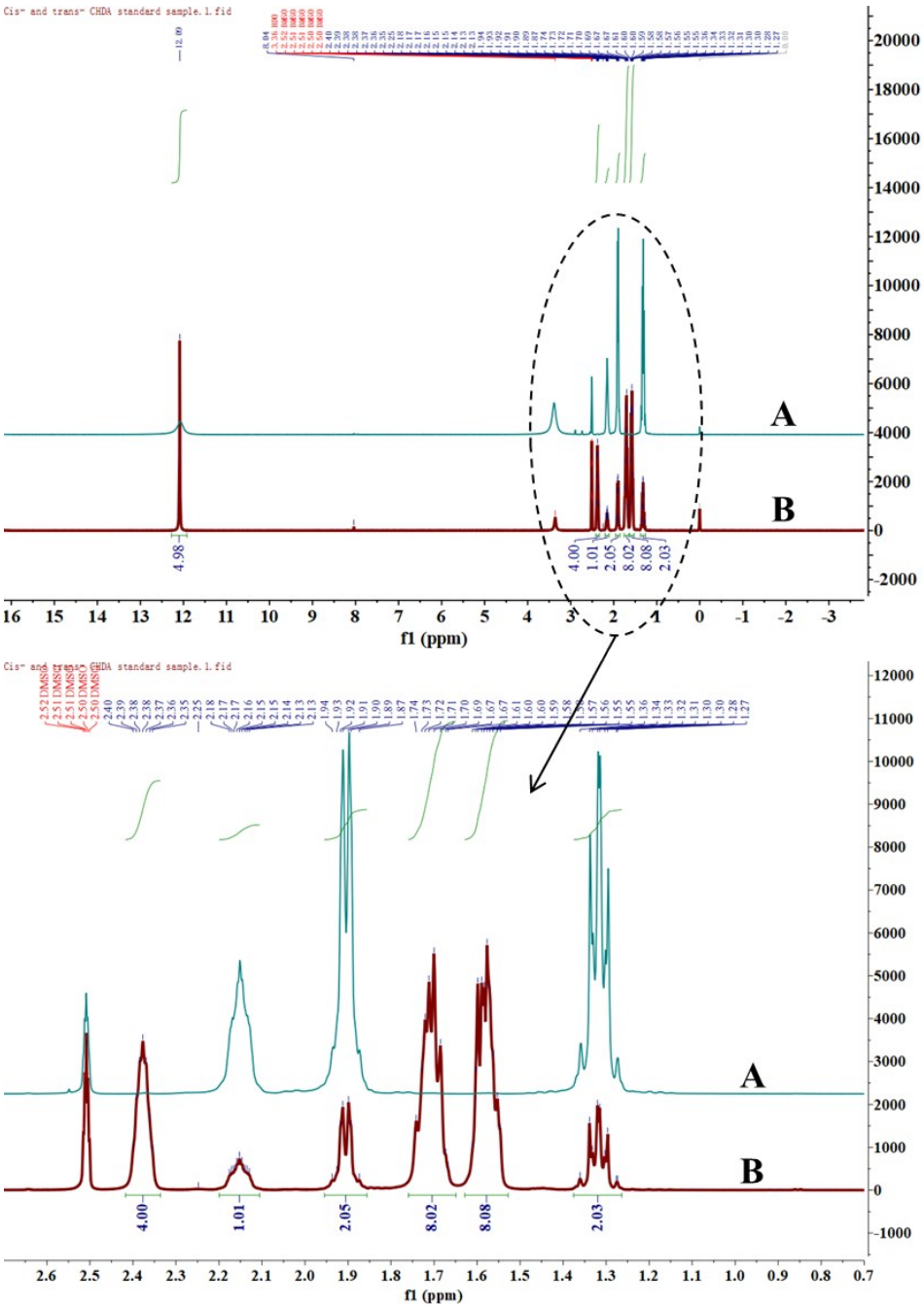

Fig. S2. *^{1}H NMR spectra of CHDA standard samples. (A) trans-CHDA and (B) cis- and trans-CHDA mixture. DMSO-d_6 was used to dissolve the samples.*

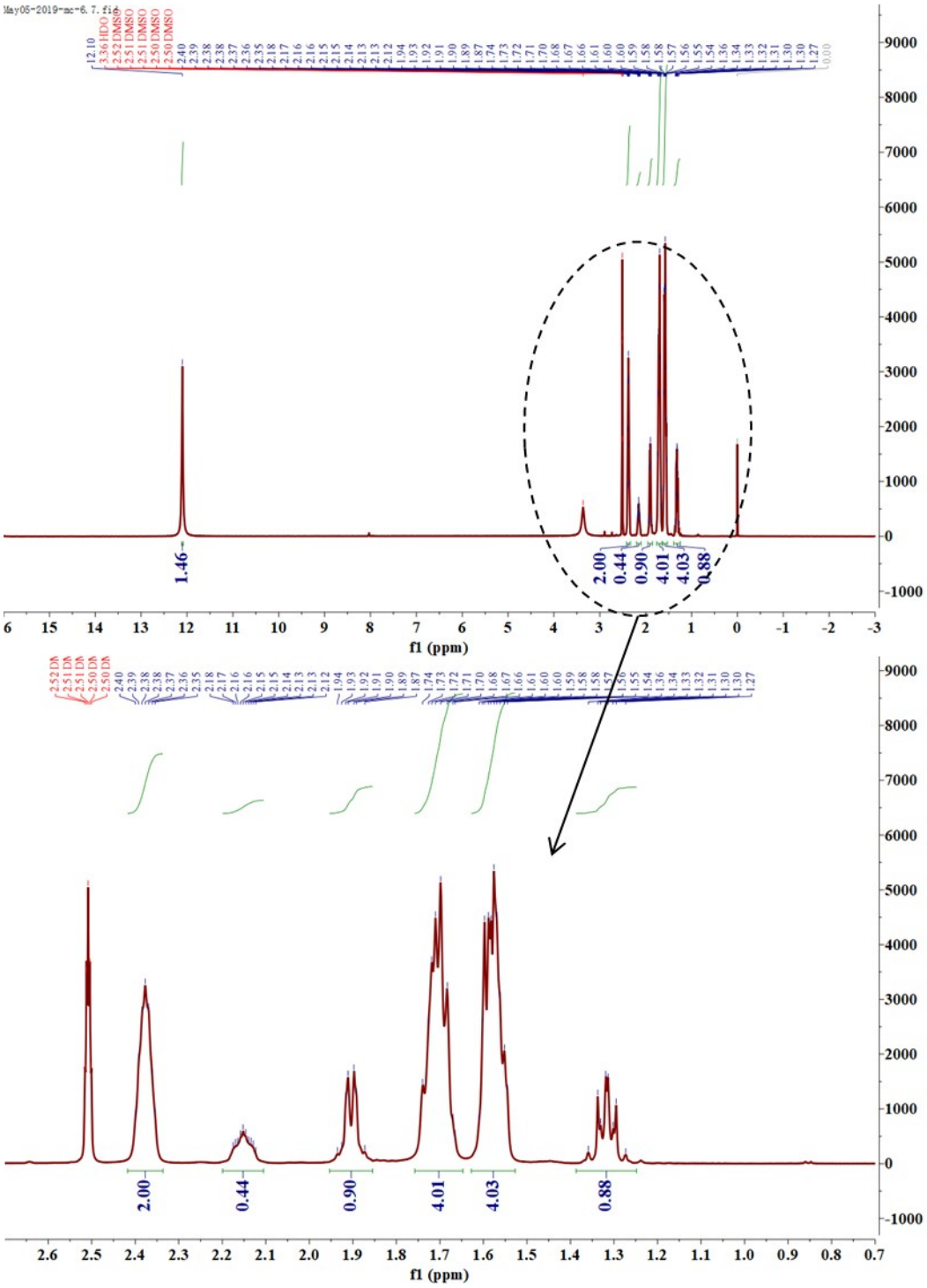

Fig. S3. *^{1}H NMR spectra of the hydrogenation product (p-phthalic acid was hydrogenated in H_2O solvent for 2h). DMSO-d_6 was used to dissolve the product.*

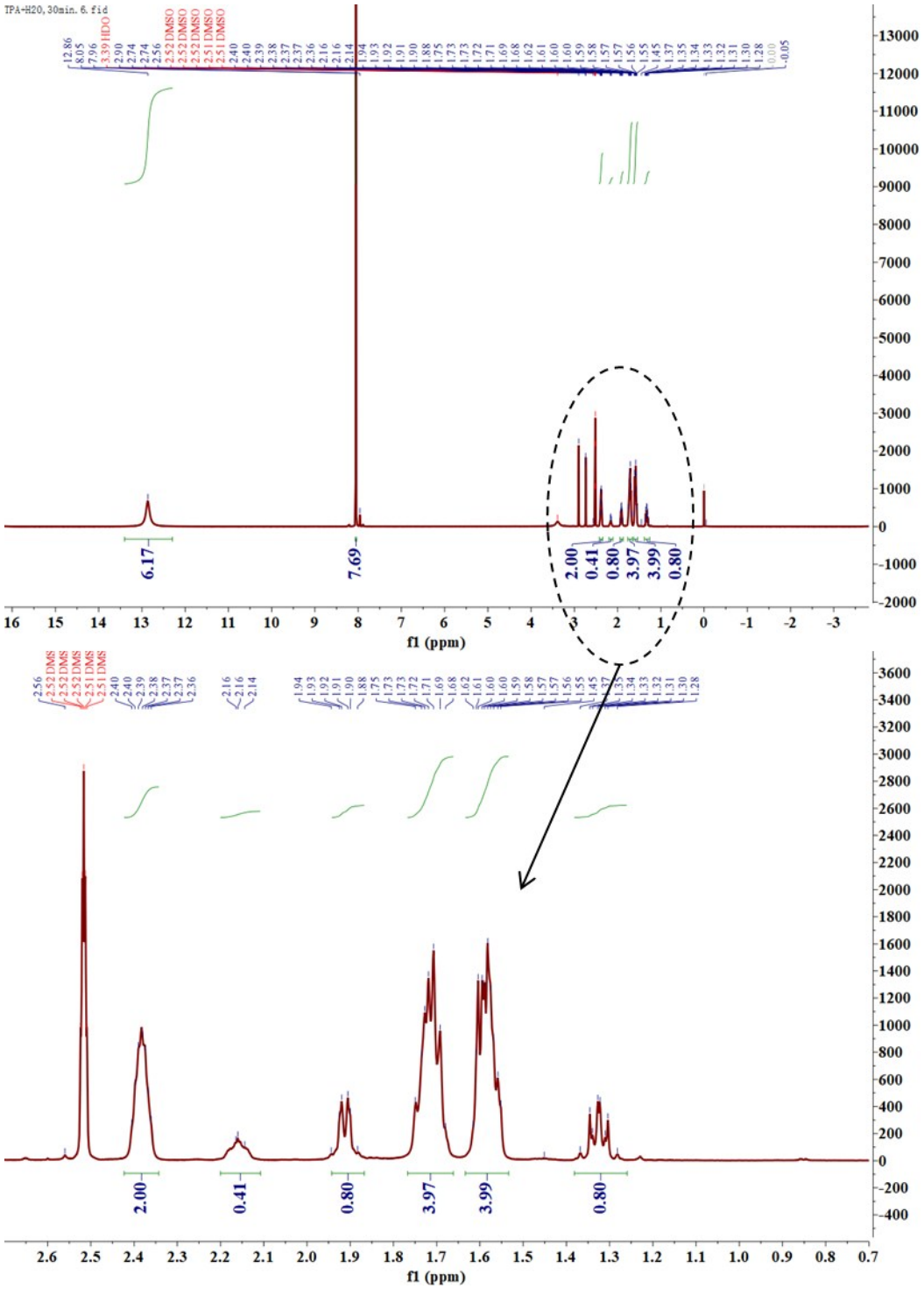

Fig. S4. *^{1}H NMR spectra of the hydrogenation product (p-phthalic acid was hydrogenated in H_2O solvent for 10min). DMSO-d_6 was used to dissolve the product.*

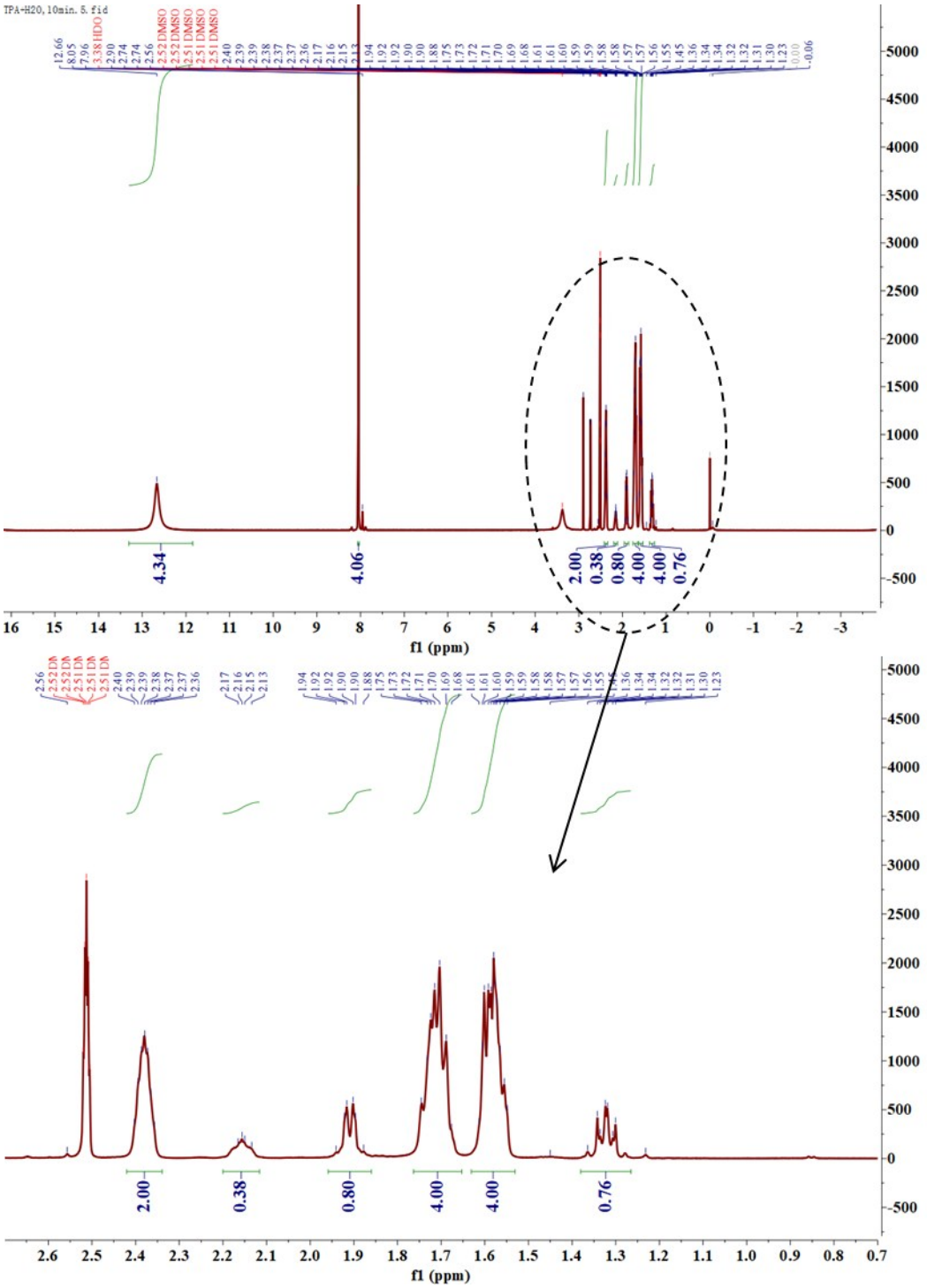

Fig. S5. *^{1}H NMR spectra of the hydrogenation product (p-phthalic acid was hydrogenated in H_2O solvent for 30min). DMSO-d_6 was used to dissolve the product.*

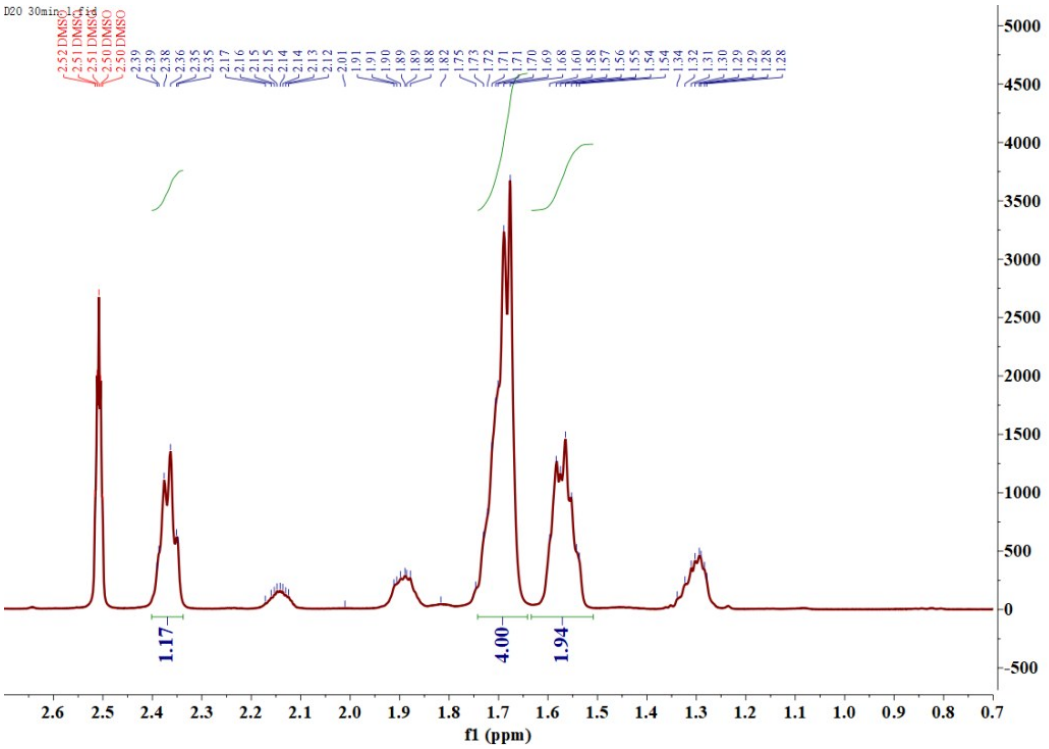

Fig. S6. *^{1}H NMR spectra of the hydrogenation product (p-phthalic acid was hydrogenated in D_2O solvent for 2h). DMSO-d_6 was used to dissolve the product.*

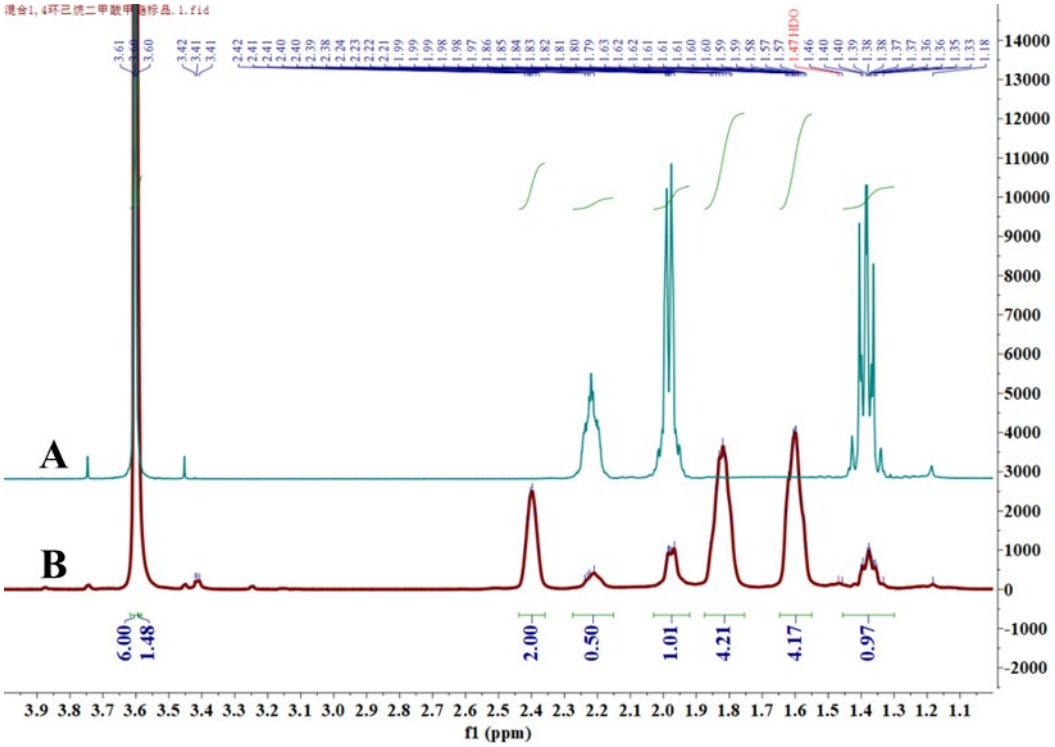

Fig. S7. *^{1}H NMR spectrum of standard dimethyl 1, 4-cyclohexanedicarboxylate samples. (A) trans-dimethyl 1, 4-cyclohexanedicarboxylate and (B) trans- and cis-dimethyl 1, 4-cyclohexanedicarboxylate mixture. $CDCl_3$ was used to dissolve the product.*

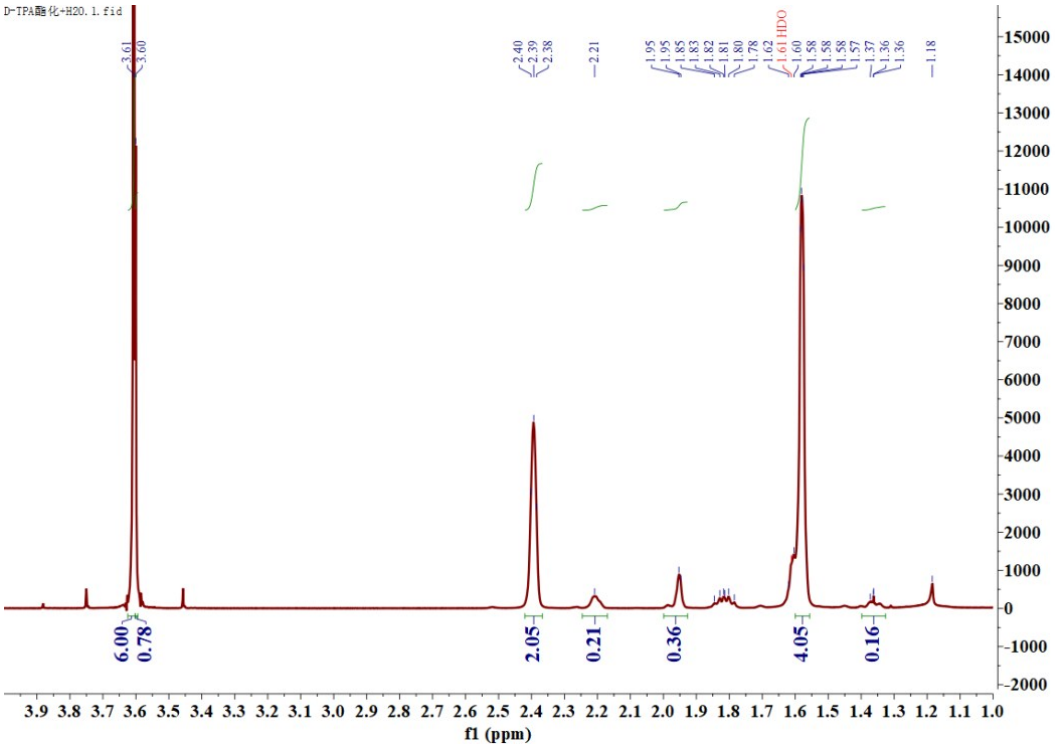

Fig. S8. *^{1}H NMR spectrum of product (p-phthalic acid-d_4 was hydrogenated in H_2O following by esterifying to dimethyl 1, 4-cyclohexanedicarboxylate). $CDCl_3$ was used to dissolve the product.*

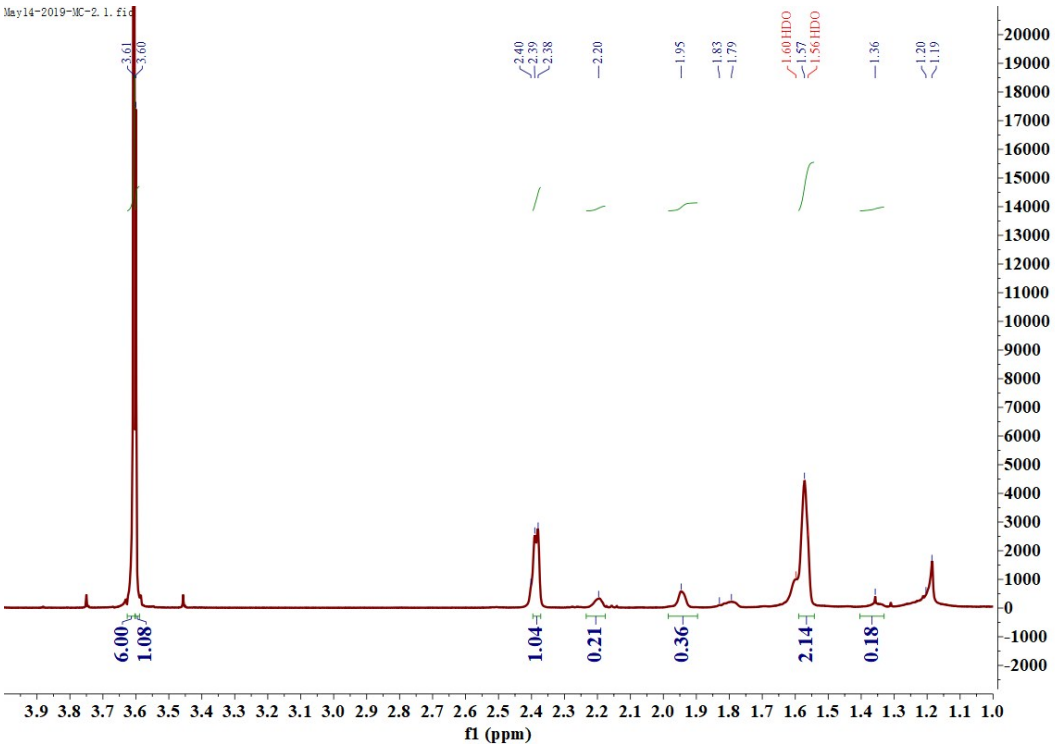

Fig. S9. *^{1}H NMR spectrum of product (p-phthalic acid-d_4 was hydrogenated in D_2O following by esterifying to dimethyl 1, 4-cyclohexanedicarboxylate). $CDCl_3$ was used to dissolve the product.*